

Thematic course: Hydrochemical synthesis of films of chalcogenide metals. Part 21.

## Obtaining substitutional solid solutions in the lead–tin–sulfur system by means of ion-exchange synthesis

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### Abstract

The analysis of effective solubility products of lead and tin(II) sulfides at the « $PbS_{solid}$  film–acetate  $SnCl_2$  aqueous solution» interface, along with analysis of a change in the Gibbs free energy of  $PbS \rightarrow SnS$  ion-exchange transformation has been performed and confirmed the possibility of formation of  $Pb_{1-x}Sn_xS$  substitutional solid solutions in the considered system. The results of scanning electron microscopy and energy-dispersive analyses have revealed changes in the elemental composition and surface morphology of tin-modified  $PbS$  layers in relation to duration of contact between a film and an acetate tin(II) chloride aqueous solution. For the first time, tin-containing films based on lead sulfide with the tin content up to 33.3 at % including a phase of  $Pb_{1-x}Sn_xS$  solid solutions have been obtained by ion-exchange substitution via incubation of thin polycrystalline  $PbS$  films in tin(II) chloride aqueous solutions at 368 K.